DOCUMENT RESUME

ED 210 221 SO 013 728

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TITLE Reasoning in Science and Social Science. A Service for Vermont Schools and Teachers.
INSTITUTION Vermont State Dept. of Education, Montpelier.; Vermont Univ., Burlington. Coll. of Education & Social Services.
SPONS AGENCY National Science Foundation, Washington, D.C.
PUB DATE Nov 80
GRANT SER-8009076
NOTE 96p.

EDRS PRICE MF01/PC04 Plus Postage.
DESCRIPTORS *Abstract Reasoning; Intermediate Grades; Junior High Schools; Learning Activities; Models; *Science Education; *Skill Development; *Social Studies

ABSTRACT

Science and social studies teachers can use these sample learning activities to teach reasoning skills in grades 5-9. The publication was developed by a group which provides information and assistance to Vermont educators of science and social studies in the fifth through the ninth grades with a focus on the teaching and learning of reasoning skills. Sample reasoning lessons were drawn from the most popular 5th through 9th grade science and social studies texts, along with some innovative lessons from non-text sources. The first part of the publication contains 32 science learning activities; the second part contains 32 social studies activities. The kind of information provided for each activity includes the following: grade level, reasoning competency, type of activity, source (e.g. textbook and publisher), materials needed, teacher directions, mastery criteria, and, in some cases, comments. The types of activities are many and varied. In the science activities students classify animals according to a key, develop a classification system based on external features, separate petroleum products into groups according to physical properties, and build a storage cell. Social studies activities involve students in constructing graphs, reading selections to find specific information, grouping historical people, classifying words, reading a selection and then putting statements in proper order, and brainstorming and analyzing. (Author/RM)

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REASONING IN SCIENCE AND SOCIAL SCIENCE

A Service for Vermont Schools and Teachers

Russell M. Agne, Editor

RISS provides information and assistance to Vermont educators of science and social studies in the fifth through the ninth grades, with a focus on the teaching and learning of reasoning skills. It piggybacks on the Basic Competencies in Reasoning to promote quality science and social studies education.

This project is housed at the University of Vermont's College of Education and Social Services, in cooperation with the State Department of Education. It is funded by a grant from the National Science Foundation. We developed RISS and applied for this funding last year as a result of teachers' interest in improving their work in reasoning.

Here's what's available to you, at no cost:

Reasoning Agents. Eleven Vermont teachers have been trained and are available to work with teachers at your school to help them to integrate reasoning skills into their science and social studies curriculum. Workshops and consultation sessions can be arranged to fit your schedule and your needs.

Compendium. We have assembled sample reasoning lessons drawn from the most popular 5th through 9th grade science and social studies texts, along with some innovative lessons from non-text sources. This compendium can be used by teachers to plan their curriculum and to teach and assess the reasoning competencies.

Our work on RISS will succeed only if you call on us. To make arrangements for a workshop, or a consultation session, or to reserve a copy of the compendium, please call or write to Russ Agne at UVM. For further details you may contact any one of us. Our Reasoning Agents are funded for only one year, so make arrangements early. We look forward to working with you.

SP013728

This material is based upon work supported by the National Science Foundation under Grant No. SER-8009076. Any opinions, findings, and conclusions or recommendations expressed in this publication are those of the project staff and do not necessarily reflect the views of the National Science Foundation.

In the operation of the RISS project, The University of Vermont will not discriminate against any person on the grounds of sex, race, creed, color, age, or national origin.

Published by IDC Publications
University of Vermont
Burlington, Vermont
November, 1980

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November, 1980

1

SCIENCE

GRADE 6

Reasoning Competency

#1 The pupil can observe and report data from an experience.

Type of Activity

Simple experiments with soil, water and erosion. Students form own experiments from suggestions.

Source

SCIENCE, Level 6, Addison-Wesley, 1980.

Materials

Textbook, (Unit 7, *Changes in the Land*, pp. 194-226; p. 198, Investigations 2 and 4)
Scales
Jars
Eyedropper
Aquarium

Directions

Investigation 2. Students devise and carry out experiment to find out the mass of sediment in a liter of muddy stream water, then report findings orally or in written form.

Investigation 4. Students devise and carry out experiment to find out how samples of water from different sources compare in the amount of dissolved rock material, then report findings.

Mastery Criteria

For mastery, students should observe and report:

Sources of samples.
Procedure(s) for experiment(s).
Specific data (weights, angles, etc.)

2

SCIENCE

GRADE 5-6

Reasoning Competencies

#1 The pupil can observe and report data from an experience.
#2 The pupil can identify the problem or issue presented in an experience.
#3 The pupil can suggest possible causes of a problem.

Type of Activity

Student will weigh jars containing different liquids and solids. Over a period of time, some of these will change in weight.

Student will:

Measure and record weight of jars.
Identify the problem.
List possible causes.

Source

COPES, New York University, 1972.

Materials

COPES, pp. 32.
baby food jars (or other small, open containers)
sand in container A
calcium chloride in container B
water in container C
alcohol in container D
balances

Directions

Use containers which are suitable in size and weight for the balances you have available.

Label containers A, B, C, D without identifying substances.

Each team of students will receive *one* jar and will weigh it, then re-weigh it after a given time span.

Students record information and hand in to teacher.

After all results are in, the teacher lists and asks students to state a question or problem that they notice.

The teacher reviews the question identified by the students and asks for written or oral responses for causes of that problem. Two causes should be given.

Mastery Criteria

If this unit is used to assess mastery, the skills must be demonstrated by:

#1 Recording data (weight)
#2 Identifying the question, "Why do some jars change weight?"
#3 Writing at least two possible reasons for the change in weight.

Comments

It may be necessary to have a place to safely store jars between weighings.

You may wish to follow this activity with additional experiments to try to *prevent* the changes in weight.

3

PHYSICAL SCIENCE

GRADE 9

Reasoning Competency

#1 The pupil can observe and report data from an experience.

Type of Activity

Observing an activity, "How to change the volume of a gas."

Source

Pathways: Insights into Science, Globe Book Co., 1977.

Materials

Textbook, page 109, "Investigation 18-
How to Change the Volume of a Gas"
Liter size soda bottle (empty)
balloon
2 pans (deep, for water)
hot and cold water
thermometer

Directions

Have students record their observations as they:

1. Stretch the opening of a balloon over the neck of the bottle. (Balloon should be "stretched" by blowing up before use.)
2. Stand bottle in pan of hot water.
3. Stand bottle in pan of cold water.

Mastery Criteria

The student must report all significant data in the proper sequence.
For example:

1. Balloon is blown up to "stretch" it.
2. When placed in hot water, the balloon slowly expands.
3. When moved to cold water, the balloon gets smaller.
4. If repeated, the size of the balloon changes according to changes of water temperature; i.e., hot = larger, cold = smaller.

4

SCIENCE (HEALTH)

GRADE 5

Reasoning Competencies

#2 The pupil can identify the problem or issue presented in an experience.
#3 The pupil can suggest causes of a problem.
#4 The pupil can suggest some solutions to a problem.
#5 The pupil can predict consequences of a problem solution.

Type of Activity

Discussion activity. Teacher directed.

Source

You and Your Health. Grade 5,
Scott, Foresman & Company, 1977

Materials

Textbook, page 19 (Girl showing angry feelings)

Directions

Have students examine the girl's picture. Use the following questions to relate to the four competencies given:
#2 What do you think could be the problem here?
#3 From your reading of page 19, what are the possible causes of her angry feelings?
#4 Give several ways the girl may solve her problem. (The teacher may relate to student situations where they solved a similar problem.)
#5 What might be the consequences of each way of solving the girl's problem? What might be some future effects?

Mastery Criteria

The teacher may wish to carry on a general class discussion as a teaching/learning process. For mastery, individual students should respond with reasonable care to the questions suggested for each competency.

Additional Ideas

Have students bring in their own photographs showing different emotional states.

5

SCIENCE (POPULATIONS)

GRADE 6

Reasoning Competencies

#2 The pupil can identify the problem or issue presented in an experience.

#3 The pupil can suggest possible causes of a problem.

Type of Activity

Examining cartoon; stating problem and possible causes; discussion.

Source

Science. (Grade 6), 1980, Addison Wesley.

Materials

Textbook, Unit 9, Populations (pp. 292-293)
Cartoon illustration.

Directions

Have students look at the cartoon and identify some of the problems or issues indicated, and suggest possible causes.

Mastery Criteria

#2 Student should clearly identify at least one problem or issue represented in the cartoon.

#3 Student should relate at least one cause to each problem noted.

Comment

It is recommended that this be done with Competencies ***#2*** thru ***#5*** combined whenever possible.

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SCIENCE

GRADE 9

Reasoning Competency

#2 The pupil can identify the problem or issue presented in an experience.

Type of Activity

Discussion of eight cartoons on pollution.

Source

Patterns and Processes, Holt, Rinehart & Winston, Revised Edition, 1970.

Materials

Copies of cartoons (pp. 72, 73 of Teacher's Edition or Textbook, pp. 78-79).

Directions

Assign a cartoon to a group of students with instructions to report to the class the issue presented by the cartoon.

Mastery Criteria

Individual students show mastery when they can present a clear statement of a problem or issue presented by the cartoon assigned.

Comment

The same cartoons may be used to assess mastery of Competencies ***#3***, ***#4***, and ***#5***.

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PHYSICAL SCIENCE

GRADE 8

Reasoning Competency

#3 The pupil can suggest possible causes of a problem.

Type of Activity

Building a force measurer.

Source

The Natural World, Silver Burdett, 1976.

Materials

Textbook, pp. 23-25.
(Having the ISCS lab materials is essential for success though not mandatory).
1 pegboard stand
1 metric ruler
1 paper clip hook
15 sinkers (fishing)
1 piece of masking tape
1 metal support

Directions

Students will assemble parts as directed by Activity 2-1, p. 23 and Activity 2-2. They should record data in student record book or on prepared tables as described on p. 24. Then students answer questions 2-13 through 2-19.

Mastery Criteria

Students should be able to express an acceptable answer to Question 2-19, "Why doesn't the rubber band make a good force measurer?"

Comment

If not equipped with student record books you will need graph paper (25 cm by 15 cm).

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BIOLOGY

GRADE 9

Reasoning Competencies

#3 The pupil can suggest possible causes of a problem.

#4 The pupil can suggest some solutions to a problem.

Type of Activity

Graph: Population explosion.

Source

Modern Biology, Holt, Rinehart, 1973.

Materials

Textbook, Page 757
graph paper
pencil

Directions

#3 Ask students to suggest causes of the problem presented in the graph. (As many as they can)

#4 Ask students to suggest solutions, as many as possible, to the population explosion.

Mastery Criteria

Students should present at least three **causes** of the problem they identify as well as three possible **solutions** to the problem.

9

SCIENCE

GRADE 5-8

Reasoning Competency

#4 The student can suggest some solutions to a problem.

Type of Activity

Series of laboratory activities on 22 Problem Cards. Experimentation with materials identified below. Students experience the ways in which various materials behave when they are heated and cooled.

Source

"Heating and Cooling", *Teacher's Guide*, ESS, Webster Division, McGraw-Hill Book Co., 1971.

Materials

Kit containing metal wires (copper and aluminum) of various diameters, copper and aluminum screening and sheets of copper, aluminum and lead.

Directions

The *Teacher's Guide* provides directions on how to proceed. Most teachers allow 45 minutes to an hour for each session. "Heating and Cooling" will take a minimum of 20 class periods.

Mastery Criteria

The student will utilize varying techinques to prevent wax from melting and falling from the heated rod. (The problem for which possible solutions are proposed.) The student must be able to explain the procedure used.

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SCIENCE (ECOLOGY)

GRADE 5,6, or 7

Reasoning Competency

#5 The pupil can predict consequences of problem solutions.

Type of Activity

Situation stories followed by discussion.

Source

Teacher constructed.

Materials

"Farmer Jones' Trees," and "The Wolf Hunters." (Next page)

Directions

Read one or both of the stories and discuss consequences or have student write answers.

Mastery Criteria

The student must answer questions giving several consequences caused by the actions taken in the story.

Examples:

Farmer Jones' Trees. Well may go dry without trees to hold water. Wind may be too strong for buildings without windbreak. Additional cleared land in production may make Jones a millionaire.

The Wolf Hunters. Deer and moose may destroy all vegetation by grazing. Sickness may destroy both deer and moose from overpopulation. Townspeople may use deer and moose as plentiful food supply.

FARMER JONES' TREES

Farmer Jones was in bad shape. He had no money. His tractor was not working, he couldn't buy grain to feed his cattle, lightning had struck his barn and destroyed it.

One day Farmer Jones decided to cut down every single tree on his one hundred acre woodlot. All the well-formed ones were cut down and trucked to the local mill. The poorly formed trees were cut up for firewood and sold.

At the end of two weeks, all the trees were cut down. Farmer Jones had plenty of money. He paid all his bills, fixed his tractor, and rebuilt his barn.

THE WOLF HUNTERS

There were very many timber wolves that lived in a certain area. There were thousands and thousands, every day more and more wolves were born. The townspeople went out and hired the famous wolf slayers, Hawkeye Bob and Sure-shot Tom. These two hunters claimed that after three days they would be able to wipe out all the wolves.

After three days, the two hunters brought the townspeople through the region where the wolves *had* lived. No wolves could now be found. The townspeople were very, very happy. They were able to live a normal life and could now visit the forests without fear of being attacked by wolves.

As time passed, the people noticed that the moose population increased by 40,000 and the deer herd increased by 50,000. Everyone wanted to know why this had happened. One of the local game wardens said, "When we had all the wolves, I didn't remember seeing all these moose and deer!"

QUESTION: *What might some possible consequences be for Farmer Jones' solution?*

QUESTION: *What might some possible consequences be for the wolf problem solution?*

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SCIENCE

GRADE 5

Reasoning Competencies

#6 The pupil can identify similarities between items.

#7 The pupil can put items into groups as described by others.

#8 The pupil can put items into his or her own groups and explain criteria used.

Type of Activity

Individual activity: grouping items.

Source

Space-Time-Energy-Matter (STEM), Addison-Wesley, 1977.

Materials

Student textbook (p. 38) or copy.

Directions

Using p. 38, have each student answer the following:

Identify similarities and differences among the twelve items shown.
Group the items by the following two categories:
Those that give off light.
Those things that hold objects together.
Select any three categories and group the items in them.

Mastery Criteria

#6, The student must show three similarities andr three differences.
#7, The student must group into three simultaneous criteria.
#8, The student must produce three different grouping systems.

Comments

Before doing this activity, review with students some possible categories. If textbooks aren't available, have each student bring in two or three items and use this collection rather than pictures.

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SCIENCE

GRADE 5,6,7,8, and 9

Reasoning Competency

#6 The pupil can identify similarities and differences between items.

Type of Activity

Scavenger Hunt.

Materials

Prepare a work sheet which lists about 20 properties (such as: blue, soft, liquid, odorless, melts, hard, transparent, black, etc.)

Directions

Students bring in a variety of materials as directed on worksheet. They use these materials in class to set up subgroups which are *alike* or *different*.

Set up teams of 3 or 4 students. Each team is responsible for collecting as many listed properties as possible. One item may cover several properties (for example, a black crayon is black, solid, melts.)

Teacher may offer a prize for teams that collect items to show *all* properties.

The teacher then has available a collection of "junk" and it can be used for discussion or to test children on similarities and differences of various objects or substances.

Mastery Criteria

Pre-mastery. Student will be able to list a minimum of 2 similarities and 2 differences for any pair of objects in the collection.
Mastery. Requires at least 3 of each, one of which must deal with a *functional* attribute.

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SCIENCE

GRADE 6

Reasoning Competencies

#6 The pupil can identify similarities and differences between items.
#8 The pupil can put items into his/her own groups and explain the criteria used.

Type of Activity

Leaf collection.

Source

Elementary Science 6, Ginn and Co., 1980.

Materials

Textbook
"Kinds of Leaves," pp. 50-54
Many kinds of leaves.

Directions

Students should bring several samples of leaves to class.

#6 How are all of the leaves similar? How are all of the types of leaves different?
#8 Using the veins as the basis for decision, separate the leaves into three groups.
#8 Using the shape of the leaves as criteria, separate the leaves into similar piles.

Mastery Criteria

#6 Students should give two or more similarities, i.e.: green veins, large central vein, dark upper, light lower.
#8 Using veins, three types should be identified (palmate, pinnate, and parallel).
#8 Leaf shapes: as above and long, round, sharp, toothed, small, big, etc.

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PHYSICAL SCIENCE (IPS)

GRADE 8

Reasoning Competency

#6 The pupil can identify similarities and differences between items.

Type of Activity

Home, desk, lab activity (HDL). Separate a list of ingredients by the method of measurement.

Source

Introductory Physical Science, 3rd Edition, Prentice-Hall.

Materials

IPS textbook, page 27. HDL #33

Directions

Follow directions given. Add to the list of ingredients with such items as: 5 slices of pepperoni, 1 can anchovies, 3 small hot peppers. Have students separate items by those measured by volume, mass, or other means.

Mastery Criteria

Student should demonstrate 100% ability to successfully separate items according to the measurement system normally used.

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SCIENCE
GRADE 5

Reasoning Competency

#7 The pupil can put items into groups as described by others.

Type of Activity

Sorting foods into starch and non-starch groups by testing.

Source

STEM Grade 5, Addison Wesley, 1980.

Materials

Textbook, page 109
iodine
droppers
cornstarch
food samples

Directions

Collect or ask students to collect samples of different foods. Demonstrate how to test for starch with iodine. Ask students to test foods for starch and to prepare lists of "starchy" and "non-starchy" foods.

Mastery Criteria

This example does not meet the mastery level criteria of three variables. To do so, the teacher may ask for groupings of "starchy" and "non-starchy" *plus* those that might be served cold or hot *plus* whether they would be served at dinner, breakfast, etc.

Additional Ideas

Students may want to elaborate this lab by preparing a display of the two types of food or by placing pictures of the food on the bulletin board.

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PHYSICAL SCIENCE

GRADE 8

Reasoning Competency

#7 The pupil can put items into groups as described by others.

Type of Activity

Separating petroleum products into groups according to physical properties.

Source

Introductory Physical Science, 3rd Edition, Prentice-Hall.

Materials

Textbook, Table 5.1, Page 71, "A Few of the Substances Found in Petroleum."

Directions

Present topic on Petroleum and introduce table 5.1 with discussion on extracting data.

Mastery Criteria

Students should be able to separate petroleum substances into the following groups:

Liquids and non-liquids at room temperature.
Solids and non-solids at room temperature.
Gases and non-gases at room temperature.

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PHYSICAL SCIENCE

GRADE 9

Reasoning Competency

#7 The pupil can put items into groups as described by others.

Type of Activity

Grouping items according to electrical conductivity or magnetism through experimentation.

Source

Pathways, Insights Into Science, Globe Book Co., 1977.

Materials

Textbook, Laboratory activity 3, "Which liquids conduct electricity?"
Laboratory activity 5, "What substances are magnetic?"
Several liquids, both conductors and non-conductors of electricity (see page 12)
A collection of materials, magnetic and non-magnetic (see page 37)
A source of DC electricity and wire
Magnets

Directions

Page 12 (conductivity), "What you do!"
Page 37 (magnetism), "What you do!"

Mastery Criteria

Teacher judgment

1. Student must group conductivity of items as follows:
   a. conductor or non-conductor
   b. good or poor conductor
   c. in order from good to poor
2. Student must group magnetism of items in the following manner:
   a. magnetic or non-magnetic
   b. strong or weak magnetism
   c. in order from strongest to weakest

Comment

1.c and 2.c may also be used as pre-mastery activities for Reasoning Competency ***#9***.

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GENERAL SCIENCE (BIOLOGY)

GRADE 9

Reasoning Competency

#7 The pupil can put items into groups as described by others.

Type of Activity

Classification of animals according to a key.

Source

Patterns and Processes, Holt, Rinehart & Winston, Revised Edition, 1970.

Materials

Textbook, pp. 11-13.
Copy of p. 12.

Directions

Have students read pages 11 and 12. They then group or classify animals on page 11 using the key from page 12 according to criteria given.

Mastery Criteria

The student should put the names of animals given into the proper category on page 12, with no errors.

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LIFE SCIENCE

GRADE 7

Reasoning Competency

#8 The pupil can put items into his or her own groups and explain the criteria used.

Type of Activity

Developing a classification system based on external features.

Source

Interaction of Man and the Biosphere, (IMB), 3rd Edition, Rand McNally, 1979.

Materials

Textbook, pp. 153-156.

Directions

Students classify into groups, imaginary animals, according to their own criteria.

Mastery Criteria

For mastery level activity, students must group figures given, using three different criteria.

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GENERAL SCIENCE (BIOLOGY)

GRADE 9

Reasoning Competency

#8 The pupil can put items into his or her own groups and explain the criteria used.

Type of Activity

Laboratory activity: grouping geometric symbols.

Source

Patterns and Processes, Holt, Rinehart & Winston, Revised Edition, 1970.

Materials

Textbook page 1 (optional Laboratory Activity) or copies of page 1.

Directions

Students should group the geometric figures into their own groups and should be able to explain the criteria used.

Mastery Criteria

For mastery, the student should be able to group items according to three criteria, i.e. circles, rectangles, projecting lines, etc. (See page 3 for two sample systems.)

Comment

The teacher should be aware that the student may develop a system which is valid although not the same as those given.

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SCIENCE (HEALTH)

GRADE 5

Reasoning Competency

#9 The pupil can put items into serial order.

Type of Activity

Movement of blood through the mammalian heart and lungs.

Source

Any well-illustrated diagram of the heart and lungs.

Materials

Diagram of the heart (without arrows showing direction of circulation).

Directions

The teacher should prepare students with lessons on the circulation of the blood through a four-chambered heart including the lungs.

Students are then asked to indicate with arrows or in writing, the direction of the flow of blood through the lungs and the chambers of the heart.

Mastery Criteria

Students should be able to describe verbally or with arrows, the flow of blood through the right pulmonary artery, lungs, pulmonary veins, left auricle, left ventricle and aorta to the body. Students should understand the reason for circulation to the lungs (for oxygen) prior to circulation to the body.

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SCIENCE

GRADE 6

Reasoning Competency

#9 The pupil can put items into serial order.

Type of Activity

Students read and discuss preservation methods of food. They have an opportunity to illustrate or demonstrate the Indian method of drying meats before being tested in serial ordering.

Source

SCIENCE, Grade 6, McGraw-Hill (Teacher's Edition), 1974.

Materials

Textbook (Teacher's Edition), p. 40; or a worksheet with the text from pp. 41 and 42.

Directions

Review the preparation of dried meat. Preliminary activities could include:

Drawing steps in preparation of dried meat.
Display of current types of dried foods (freeze dried, etc.)
Actual preparation of jerky as described in textbook.

Assess by using a jumbled set of sentences.

Mastery Criteria

The student will copy the following statements in correct serial order and justify this order.

A. Hang the strips of meat on a rack.
B. Place strips of meat in a plastic bag.
C. Heat the meat in the oven until it is dry.
D. Cut the meat into strips 4 cm wide and 0.5 cm thick.

Answer: (D,A,C,B)

Comment

Plan to demonstrate what happens if you don't dry the strips of meat (mold and decay).

23

SCIENCE

GRADE 6

Reasoning Competency

#9 The pupil can put items into serial order.

Type of Activity

Student constructed graph or table.

Source

Elementary Science 6, Ginn and Co., 1980.

Materials

Textbook, pp. 192-193
graph paper
pencils

Directions

Students should read pp. 192-193 about various rates of heartbeat.

Based on the information given students should construct a graph or table, putting the heartbeat rates in order from low to high. The same graph or table could include estimated animal size.

Mastery Criteria

Graphs or tables should give the heartbeat rates from low (elephant at 20) to high (mouse at 500) and animal size from small to large.

Additional Ideas

Have students research the heart rate and average size of other animals.

24

EARTH SCIENCE

GRADE 9

Reasoning Competency

#9 The pupil can put items into serial order.

Type of Activity

Laboratory activity: ordering substances according to hardness.

Source

Pathways: Insights Into Science, Globe Book Co., 1977.

Materials

Textbook, p. 97, #IV, "Try This"
Assortment of rocks, minerals
Assortment of metals: copper, lead, steel, brass

Directions

Separate rock samples by hardness by using metals to scratch testing samples according to directions given.

Mastery Criteria

The student must order the rock samples from softest to hardest and cite reasons for the order given.

25

PHYSICAL SCIENCE

GRADE 8 & 9

Reasoning Competency

#9 The pupil can put items into serial order.

Type of Activity

Building a storage cell.

Source

Probing the Natural World, Silver Burdett, revised 1976.

Materials

Textbook, pp. 3-6
plastic cup
2 sheets of lead (30 cm long)
2 strips of lead (7.5 cm)
2 pieces cardboard (35 cm x 5 cm)
1 rubber band
sodium sulfate solution
1 large rubber band
1 small light bulb and socket
2 test leads

Directions

Student follows directions (Activity 1-1 to 1-10) putting materials together so that they construct a functioning "storage cell."

Mastery Criteria

Students will perform the activities until they have a workable storage cell. A functioning cell will indicate that they have performed the task in the proper serial order.

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SCIENCE

GRADE 5 or 6

Reasoning Competency

#10 The pupil can distinguish between statements of fact and statements of opinion.

Type of Activity

Worksheet and discussion to be used during a unit on the weather.

Source

Teacher prepared.

Materials

Worksheet with "Weather Observations".

Directions

Teacher distributes a worksheet similar to the following:

Mark the following sentences **F** if a fact and **O** if an opinion.

Examples:

O (1) It's a nice day.
F (2) The temperature is 78°F.
F (3) We had 1.5 inches of rain yesterday.
F (4) The measured wind velocity is 50 m.p.h.
F (5) Sunrise was at 6:35 a.m.
O (6) Tomorrow will be partly cloudy.
O (7) It's too windy to go sailing.
F (8) The humidity is 70%.
F (9) The wind is coming from the NE.
O (10) It's too hot today.

Mastery Criteria

Students are asked to show which are statements of fact, which are opinions. Student will correctly answer all of the questions.

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SCIENCE (BIOLOGY)

GRADE 9

Reasoning Competency

#10 The pupil can distinguish between statements of fact and statements of opinion.

Type of Activity

Reading of article and discussion.

Source

Patterns and Processes, Holt, Rinehart and Winston, Inc., 1970.

Materials

Textbook, p. 261 or copy. (Teacher's Edition, p. 267)

Directions

Have students read the article on albinism. Provide blank paper with two headings, fact and opinion. Have students put statements from the article that are fact or opinion under the proper heading.

Mastery Criteria

Students should accurately separate those statements which are fact from those that are the opinion of the author and be able to give justification for their choices.

Comment

Newspaper or magazine articles which mix factual statements with statements of opinion may be substituted.

28

SCIENCE

GRADE 6

Reasoning Competency

#11 Given a dilemma situation, the pupil can take at least two positions and give reasons for each.

Type of Activity

Teacher-led discussion of how scientists monitor populations of bacteria in water, bald eagles in U.S., gypsy moths in Vermont, and mosquitoes.

Source

Science, Level 6, McGraw-Hill, Teacher's Edition.

Materials

Textbok (p. 33) or newspaper clippings.

Directions

After a discussion period, the teacher will point out that often, when a population of mosquitoes becomes annoying to people in a particular area, some residents may request a spraying program.

Students are directed to state 2 points of view about a spraying program and list several reasons to support each point of view.

Mastery Criteria

The student will state at least 2 reasons in favor of, and 2 reasons opposed to, the spraying program and give reasons for their answer.

Possible answers:

Pro: Mosquitoes are annoying. The town should get rid of them.
Some mosquitoes carry diseases.

Con: Sometimes pesticides are sprayed on water supplies or food by mistake.
Some pesticides are harmful to fish and birds.

29

LIFE SCIENCE

GRADE 7

Reasoning Competency

#11 Given a dilemma situation, the pupil can take at least two positions and give reasons for each.

Type of Activity

Reading and class discussion of the effect of environmental resistance on populations.

Source

Interaction of Man and the Biosphere (IMB), Rand McNally, 3rd edition, 1979.

Materials

Text, pp. 167-170
See also Teacher's Edition, p. 170a.

Directions

Students read text and carry on class discussion to gain understanding of environmental existence. Teacher may establish a dilemma situation based on use of antibiotics, for example, to change environmental resistance. Students respond with possible effects with reasons for each.

Mastery Criteria

The student should give at least two reasons for the statement of dilemma situation.

30

SCIENCE (WEATHER)

GRADE 5

Reasoning Competency

#12 From a chart, graph, table, map or list of facts, the pupil can state a summary or conclusion based on the data.

Type of Activity

Individually constructed charts for reading relative humidity and dew point temperature. Students review data presented by chart(s).

Source

Elementary Science: Learning by Investigation, (ESLI) Rand McNally & Co., 1973.

Materials

Textbook, chapter 3, pp. 120-121.
Chart with recorded data.
Series of 5 questions to be asked in relation to charts.

Directions

Recommend that students be allowed to state any observations or noted relationships before structured questions are asked.

Use data to answer questions given.

1. When the temperature increases during the day, what usually happens to the relative humidity?
2. When the temperature and dew point are close, what is usually true about relative humidity?
3. When relative humidity increases, what usually happens to barometer reading?
4. What is usually the relationship of the barometer reading to the sky covering and relative humidity?
5. Can you find any relationship between wind direction and relative humidity?

Mastery Criteria

Additional questions or student observations should provide valid conclusions resulting from two or more variables.

Students may arrive at valid conclusions other than those identified by the teacher.

Additional Materials

Similar questions could be asked in reference to charts found in newspapers, magazines, or other sources.

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SCIENCE (WEATHER)

GRADE 6

Reasoning Competency

#12 From a chart, graph, table, map or list of facts, the pupil can state a summary or conclusion based on the data.

Type of Activity

Students measure water vapor in the air using a wet and dry bulb thermometer and the relative humidity table.

Source

Elementary School Science Book 6, Addison-Wesley Publishing Company.

Materials

Wet and dry thermometer with loop or holder which permits swinging in the air.
Copies of relative humidity table, p. 32 of textbook or p. 43 of Teacher's Guide.

Directions

Students will be shown how to take "dry bulb" and "wet bulb" temperature readings. They will keep a chart for one or two weeks, recording the following on a table, chart, or graph:

Date
Relative humidity
Weather (clear, cloudy, raining)
Temperature

Mastery Criteria

The student will provide summaries of their observations, providing valid conclusions resulting from two or more variables. Conclusions might be like the following:

*The relative **humidity** is higher on **rainy** days.*

*The sky is **clear** on days when the relative **humidity** is low.*

Teachers should be aware that students may draw valid conclusions other than those predicted by the teacher.

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PHYSICAL SCIENCE

GRADE 9

Reasoning Competency

#12 From a chart, graph, table, map, or list of facts, the pupil can state a summary or conclusion based on the data.

Type of Activity

How can you prevent rapid rusting?

Source

Pathways, Insights into Science, Globe Book Co., 1977.

Materials

Textbook, pp. 122-123

Iron nails	Fine sandpaper
paper	pencil
cotton	milk carton
water	table salt
house paint	water colors
oil	fat
nail polish	vinegar

Directions

Rub the nails with sandpaper until they are shiny. Cut eight pieces of paper 2cm x 6cm and write one of the substances on each piece (i.e., untreated, salt solution, house paint, etc.). Coat a nail with one of each of the seven substances. Push the nail through the proper paper. Cover the bottom of the milk carton with a layer of cotton. Pour water into the cotton to saturate. Place the nails in the carton so they are laying on the wet cotton. Leave the nails one week or more. Examine the nails each day, recording their condition on a chart.

Mastery Criteria

From the data on the chart, the student should determine the best rust inhibitors, and give a summary of the results.

Comment

To meet true mastery criteria, another variable such as heat vs. cold should be introduced.

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SCIENCE

GRADE 6

Reasoning Competency

#13 From a list of data and several possible conclusions, the pupil can identify those conclusions which could be validly drawn from the data.

Type of Activity

Student activity with bottles and liquids, measuring flow rates.

Source

Elementary Science Study, Unit in "Kitchen Physics", Teacher's Guide pp. 20 and 30.

Materials

Plastic bottles of the same size
4 plastic lids with large to tiny holes in them.
(An electric drill will quickly form clean holes of different size)

Directions

Using plastic bottles filled with water, the student finds out how many seconds it takes for the water to flow out, using different lids.

1. Measure time to empty with water, using 4 types of lids.
2. Record the data.
3. Choose one of the following conclusions, based on the data:
    A. The lid with the smallest hole takes longest to empty
    B. The larger the hole, the longer it takes to empty
    C. The size of the hole doesn't make any difference in the time to empty.

Mastery Criteria

The student selects a valid conclusion, based upon his or her data and explains reasons for the selection.

Comments

If you don't like to spend time checking individual reports, you could present a test question that presented some specific numbers for Time to Empty: "If a student had the

following results for Time to Empty, which conclusion should he choose?

Lid Size					
Time (in sec)	398	62	42	31	11

A follow-up of this activity could raise the question of how to speed up the flow and relate to Reasoning Competencies ***#3***, ***#4***, and ***#5***.

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PHYSICAL SCIENCE

GRADE 9

Reasoning Competency

#13 From a list of data and several possible conclusions, the pupil can identify those conclusions which could be validly drawn from the data.

Type of Activity

Laboratory investigation: what happens when magnets are brought near each other?

Source

Pathways: Insights into Science, Globe Book Co., 1977.

Materials

Two bar magnets
a piece of string
a cardboard carton
plastic tape

Directions

(See textbook, p. 41)
Tie a string around the middle of a bar magnet. Fasten the string in place with plastic tape. Attach the other end of the string to the top of the carton. The magnet should be free to swing. Hold the other magnet in your hand. Bring one of its ends near an end of the swinging magnet.

Mastery Criteria

The student should choose two correct rules from four possible rules given:

A. Like poles repel
B. Like poles attract
C. Unlike poles repel
D. Unlike poles attract

Comment

This activity could also be used for Reasoning Competency ***#1***.

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SCIENCE (BIOLOGY)

GRADE 9

Reasoning Competency

#13 From a list of data and several possible conclusions, the pupil can identify those conclusions which could be validly drawn from the data.

Type of Activity

Laboratory activity: population graphs.

Source

Patterns and Processes, Holt, Rinehart & Winston, Revised Edition, 1970.

Materials

Textbook, pp. 55-56
graph paper
pencil

Directions

Students should construct a graph from data given.

Comparisons of similarities and differences should be made with other graphs given.

Students should make conclusions from their own comparisons.

Students should give reasons for conclusions drawn by others.

Mastery Criteria

For mastery, students must verify conclusions drawn from data given and give reasons for their choices.

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SCIENCE

GRADE 5

Reasoning Competencies

#14 The student can gather data on a given topic from at least three different sources.

#15 The pupil can select and organize data on a given topic into a meaningful report.

Type of Activity

Research and presentation, oral or written, of a report.

Source

Teacher directed.

Materials

Library materials on animal life (books, magazines, encyclopedias, filmstrips, movies.)

Directions

The teacher will plan and give directions for a research unit. Directions should be given on the number of references (three), the format, and the manner in which the report is to be given (written or oral).

The student will:

Choose an animal.

Take notes on topics suggested by the teacher, such as appearance, range, habitat, food, life cycle.

Find 3 sources of information.

Organize notes into a logical sequence.

Prepare an oral or written report.

Prepare a final report.

Mastery Criteria

The student will present a written or oral report. The report should not be repetitious, not contain irrelevant or indirect informaiton and should be in a logical sequence.

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SCIENCE
GRADE 6

Reasoning Competencies

#14 The pupil can gather data on a given topic from at least three different sources.

#15 The pupil can select and organize data on a given topic into a meaningful report.

Type of Activity

Research project on nuclear energy.

Source

Teacher directed.

Materials

Pamphlets from Vermont Yankee Nuclear Power Plant, Vernon, Vermont.
Anti-nuclear written material.
Newspaper articles.
Guest speakers.
Textbooks or filmstrips as available.

Directions

The teacher can point out that the use of nuclear power presents a dilemma. People need to decide whether or not they favor the expansion of nuclear power in Vermont, and this unit will allow students to see how to reach a conclusion.

Students are directed to gather information by collecting newspaper clippings, writing to organizations for information, watching film strips or video tapes if available, and interviewing their own families or other adults.

Mastery Criteria

The student will prepare an organized report stating his or her own opinions about nuclear power. He should include information from at least three different sources.

The final report may be oral or written. The student must identify the source of information and opinions presented in the report.

Comment

This could also be used to teach Reasoning Competency ***#11*** (Dilemma situation).

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SCIENCE (BIOLOGY)

GRADE 7

Reasoning Competency

#14 The pupil can gather data on a given topic from at least three different sources.

Type of Activity

Students will develop, after research, a description of a food web.

Source

Interaction of Man and the Biosphere (IMB), Rand McNally, 3rd edition, 1979.

Materials

Text (pp. 179-181), library materials, other textbooks, articles, encyclopedias, interviews, and other student selected sources.

Directions

Students construct a model of a food web based on eating habits. Students should do library and other research about those animals which are not familiar.

Mastery Criteria

Students should use at least three sources in their search for information, listing sources used.

Comment

An oral or a written report prepared and presented from these data could be used on mastery of Reasoning Competency ***#15***.

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PHYSICAL SCIENCE

GRADE 8

Reasoning Competency

#14 The pupil can gather data on a given topic from at least three different sources.

Type of Activity

Building a better force measurer.

Source

The Natural World, Silver Burdett, 1976.

Materials

1 force measurer, thin blade
5 paper clips
3 nails
1 sinker
1 cup
8 washers
1 plastic card with curved line

Directions

Students will zero plastic cards and proceed to identify weight as a kind of force. Continue with activities creating a "scale" with washers. Then after completing Activity 2.6, answer questions 2.22 through 2.29 in the student record book.

Mastery Criteria

Mastery is demonstrated by answering question 2.27, *Did any of your classmates get results that were different than yours?* Show data from two other classmates.

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PHYSICAL SCIENCE

GRADE 8

Reasoning Competency

#15 The pupil can select and organize data on a given topic into a meaningful report.

Type of Activity

Using the force measurer as a force supplier.

Source

The Natural World, Silver Burdette, 1976.

Materials

Textbook, pp. 147-157
1 inclined plane, thick blade
1 force measurer, with Newton card
Bolts, 2 wing nuts
2 force measurers
1 cart
1 push rod

Directions

Follow directions given for activities 8.1 through 8.8 on pp. 148-153.

Mastery Criteria

Students, after completing table 8.1 on p. 155, will answer questions 8.13 through 8.22.

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SOCIAL STUDIES, PROBLEM SOLVING

GRADE 5-6

Reasoning Competencies

#1 The pupil can observe and report data from an experience.

#2 The pupil can identify the problem or issue presented in an experience.

#3 The pupil can suggest possible causes of a problem.

#4 The pupil can suggest some solutions to a problem.

#5 The pupil can predict consequences of problem solutions.

Type of Activity

Drawing analysis.

Source

Teacher constructed.

Materials

Drawing

Directions

Give students copies of the drawing of a skier wrapped around the tree. This may also be be put on an overhead.

Have them look at the drawing and write down what they see.

Have the students state the problem.

Have the students propose possible causes of the problem.

Ask the class to propose possible solutions to the problem.

List these solutions on the chalkboard and predict the consequences for each of these solutions.

Mastery Criteria

The student will be able to apply the problem solving process to a given situation.

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CIVICS, POLITICS

GRADE 9

Reasoning Competencies

#1 The pupil can observe and report data from an experience.

#2 The pupil can identify the problem or issue presented in an experience.

#3 The pupil can suggest possible causes of a problem.

#4 The pupil can suggest some solutions to a problem.

#5 The pupil can predict consequences of problem solutions.

Type of Activity

Cartoon analysis.

Source

Political cartoons from newspapers.

Materials

Cartoons appropriate for grade level.
Current events magazine with cartoons.
Teacher-constructed response sheet.

Directions

Ask students to examine a cartoon and answer the following questions on the response sheet.

What do you see in this cartoon?
What is the problem or issue being presented?
List at least two possible causes of the problem.
List at least two solutions to the problem.
What will be the results of the solutions?

Lead the class in a discussion from selected examples of how to analyze a cartoon.

Post selected cartoons on a bulletin board to illustrate analysis of political problems or issues.

Mastery Criteria

The student will be able to identify the problem or issue, suggest two possible causes and solutions, and list consequences of those solutions.

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GEOGRAPHY, REGIONAL STUDIES

GRADE 7

Reasoning Competencies

#1 The pupil can observe and report data from an experience.

#6 The pupil can identify similarities and differences between items.

Type of Activity

Map Study.

Source

Regional Studies: Investigating Man's World, Scott Foresman, pp. 28, 33, and 138.

Directions

1. Show the students three maps of a state (state not identified) showing railroads, interstate highways, and population distribution with urban and rural. Have the students identify the part of the state where railroads, interstate highways, and centers of population are located. The students then make hypotheses as to why the railroads, interstate highways, and urban centers are located in those particular parts of the state.

2. Students are then referred to maps on pp. 28 and 33 which show: the name of the state, elevations, average annual precipitation, and natural vegetation of the state. Students then have to verify their answers to Part 1. with the information in Part 2. Students should be able to show the relationships between people-made settlements and geographic elevation, precipitation and natural vegetation.

Mastery Criteria

#1 The student will observe and report on locations of railroads, urban centers, and interstate highways in a given state.

#6 The student will identify similarities and differences in a given state from a series of maps.

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U.S. HISTORY, INDUSTRIALIZATION

GRADE 8

Reasoning Competency

#1 The pupil can observe and report data from an experience.

Type of Activity

Graph construction.

Source

A Guidebook for Teaching United States History: Mid-Nineteenth Century to the Present, Allyn and Bacon, Inc., Chapter 2, "Industrialization," pp. 23 and 49.

Materials

Worksheet, "Miles of Railroad Track."
Data from next page.

Directions

Introduce the activity with an overview of the Westward Movement and the effect of the railroad on settlement.

Explain by demonstration how a graph can be created from demographic information.

Distribute the worksheet and go over the directions. You might want to provide the students with lined graph paper.

Have the students develop their own individual graphs and make a one-sentence statement on the growth of railroads.

Mastery Criteria

The student will be able to develop the graph and make a statement on the growth of railroads.

MILES OF RAILROAD TRACK

Year	Miles in Operation	Year	Miles in operation
1830	23	1870	52,922
1835	1,098	1875	74,096
1840	2,818	1880	93,296
1845	4,633	1885	128,361
1850	9,021	1890	166,817
1855	18,374	1895	181,021
1860	30,626	1900	194,814
1865	35,085		

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GEOGRAPHY, AGRICULTURAL REVOLUTION

GRADE 7

Reasoning Competency

#6 The pupil can identify similarities and differences between items.

Type of Activity

Reading and finding information.

Source

World of Mankind Series: Man the Toolmaker, Follett Pub. Co., 1973 Edition.

Materials

Readings on pp. 113-117. (Case studies of corn, wheat, and rice as crops).

Directions

Have the students read the three passages and look at the accompanying pictures (pp. 113-117 in the student book).

Ask them to list at least three similarities among the three crops. You might ask them,

Find at least three things that are the same for all three crops.
What are some things common to corn, wheat, and rice?
In what ways are all three crops the same?

When they have completed the list of similarities, have them list at least three ways the crops are different. You might ask,

In what ways is each of these crops unique and different from the others?
Find three differences between these crops.
How are corn, wheat, and rice different?

Mastery Criteria

For mastery, the student's list must include at least three similarities and three differences. At least one of each must relate to the *use* or *function* of the crop.
For example:

Rice, corn, & wheat all require water & light to grow.
All three are currently harvested in North America.

All three can be ground into flour to make a pastry. (Functional)
Rice requires more water than corn & wheat.
Wheat is almost always ground up before being consumed.
Wheat is suited to a cool, dry climate.
Rice is suited to a warm, wet climate.
Corn is more versatile.

Additional Materials

Some actual corncobs, wheat stalks, and rice plants would make this activity even richer. So would some corn meal, rice flour, and wheat flour, or some tortillas, fried rice, and a loaf of bread.

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CIVICS, POLITICS

GRADE 9

Reasoning Competency

#6 The pupil can identify similarities and differences between items.

Type of Activity

Reading and ordering information.

Source

American Citizenship, Scholastic Book Services, New York, New York, 1980 (Revised Edition).

Materials

Text or similar government profiles from other sources.

Response sheet or scale sheet 1 through 10 (1 being the most democratic and 10 being the most totalitarian).

Directions

Provide the students with some examples of similarities and differences.

Define the terms *democratic* and *totalitarian*.

Have the students read pp. 34-38 which profile the governmental organization of four modern nations.

Have the students make a list of similarities and differences that they find in the four governmental organizations.

If the scale is used, have the students rate the nations on the scale and explain in writing or verbally, why they placed the nations where they did.

Share information put together by students in class or check each student individually.

Mastery Criteria

The student will identify at least three similarities and three differences after reading the information and analyzing it.

If the scale is used, the student will identify the similarities and differences which led him or her to assign a particular rating to the nation's governmental system.

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U.S. HISTORY, CIVIL WAR

GRADE 8

Reasoning Competency

#7 The pupil can put items into groups as described by others.

Type of Activity

Checklist.

Source

A Guidebook for Teaching United States History: Earliest Times to the Civil War, Allyn and Bacon, Inc., Chapter 6, "Civil War and Reconstruction," p. 161 and reproduction p. 102.

Materials

Worksheet, "Events that Help or Hurt the Union."

Directions

After studying the events which lead to the Civil War, distribute the worksheet. Have students indicate whether each of the events helped or hurt the Union cause.

After completing the worksheet, have students defend either orally or by written statement the reason for their selections.

Mastery Criteria

The student will appropriately group each item according to helpful or harmful effects on the Union cause.

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U.S. HISTORY, MIGRATION

GRADE 8

Reasoning Competency

#7 The pupil can put items into groups as described by others.

#11 Given a dilemma situation, the pupil can take at least two positions and give reasons for each.

Type of Activity

Card sort.

Source

Minneapolis Multi-Ethnic Curriculum Project, Migration Unit, Activity 3: "What Would You Do?

Materials

4 Class Sets of Evidence Cards.
Response Sheets.

Directions

Divide the class into several small groups of no more than five students for this activity. Then give each group a set of B, C, or D evidence cards. Four cards in each set represent conditions in the United States during the mid-nineteenth century. The other four cards represent possible conditions in another country at the same time. This should be explained to the students.

Have each group mix up the cards they have. Now have them draw five of those cards at random. Give each group a Response Sheet and have them classify the cards as showing conditions favoring migration or against migration on that sheet. The group should then decide what they would do, migrate or stay, under those conditions. After they have indicated their decision, the group members should provide reasons for that decision. Collect the Response Sheets from the groups and post them.

Now follow a similar procedure several more times. For example, in the second round the teacher can introduce restriction immigration policy by refusing the let country B enter the U.S.; round three, job skills as priority for entry, etc. Have the students look closely at the posted Response Sheets. Then discuss the following questions:

What conditions were most favorable to migration?

Did conditions in the United States or in the old country have a greater influence on migration?

Did one country have conditions which made it more likely for people to emigrate? If so, what were they?

How does this help to explain why large numbers of immigrants came to the United States from some countries while very few immigrants came from other countries.

Mastery Criteria

The student will be able to state at least two positions and five reasons for each, such as:

POSITIONS	REASONS
Stay in Country	Civil War in U.S. Too old to move. Good economic and political conditions at home.
Move to the United States	Free land in U.S. Gold in U.S. Relatives in U.S. Religious persecution in home country.

The student will also be able to classify the reasons according to conditions favoring and conditions against.

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AREA STUDIES

GRADE 6

Reasoning Competency

#8 The pupil can put items into his or her own groups and explain the criteria used.

Type of Activity

Grouping of historical people.

Source

Exploring World Regions, Follett Publishing Co., 1975

Materials

Text passage, "Mexico's Stormy Century", pp. 118-123 from student text.

Directions

After students have read and discussed this chapter, have them work in pairs. Give each pair of students 25 small pieces of paper or 3x5 cards. Tell each pair to write on the cards the names of each of the people who are mentioned in the chapter. Encourage them to share the workload. When they have each name on a card, tell them to *group* the cards somehow. It's up to them to come up with a grouping system.

Go around the class to see how they're doing. They may come up with groupings like:

military/civil leaders	*19th/20th century leaders*
men/women	*revolutionaries/status quo-ers*
alphabetical order	*modernists/traditionalists*
chronological order	*and many others you never even thought of.*

As each pair comes up with a grouping, write it on the board. Then tell the pair to mix the cards up and come up with another grouping system.

Do this for 20 minutes or so, then duscuss the list of groupings you have generated.

Mastery Criteria

The student will be able to come up with three different systems for grouping the same list of items. To assess mastery of individual students, just follow the same steps with *individuals* doing the work instead of pairs. If a student can come up with three or more different groupings, one after another, then he or she has mastered this skill.

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U.S. HISTORY, TERRITORIAL EXPANSION

GRADE 8

Reasoning Competency

#8 The pupil can put items into his or her own groups and explain the criteria used.

Type of Activity

Card sort.

Source

Any 8th grade U.S. History text.

Materials

Teacher prepared Territorial Acquisition Cards.

Directions

This activity can be used after students have completed a unit of study on the territorial growth of the United States. Then, use the following procedure:

Make several sets by writing the name of the following territorial acquisitions on 3x5 cards.

Cuba	Midway Islands
Phillipines	Virgin Islands
Hawaii	Puerto Rico
Wake Island	Oregon
Texas	Louisiana Purchase
Thirteen Colonies	Mexican Cession
Alaska	Gadsen Purchase

Have students assemble in small groups and distribute on set of cards to each.

Tell each student group to construct different categories for the list of acquisitions. Have the students identify each category and list the acquisitions on a sheet of paper. Allow the students to use their text.

When the students have completed their task, have each group share their groupings with the class. Some examples might be:

Islands/Continental
Acquired by War/Purchased

Acquired from: Spain/England/Russia/France/Denmark/Mexico
Dates: 1783, 1803, etc.

Mastery Criteria

The student will be able to identify three different systems for grouping the same list of items.

51

CIVICS, GOVERNMENT

GRADE 9

Reasoning Competency

#8 The pupil can put items into his or her own groups and explain the criteria used.

Type of Activity

Word sort.

Source

American Citizenship Program: Foundations of our Government, Scholastic, Chapter 2, "How to Study Government", p. 6.

Materials

Worksheet, "Classifying: people, places, and things," or copy. Index Cards.

Directions

Tell the students that they will be given a set of terms, preferably on index cards, to classify. Each student or group of students will sort the terms and make a heading for each. You can use a shoe box or simply have the students place the cards in separate piles.

Be sure the students understand the term *classify* and give one or two examples.

Now, have the students read the directions on the worksheet and complete the classification activity.

Finally, have the students share their lists with the rest of the class. You might want to use the following questions as a guide:

What differences/similarities were there in student classification lists?
How can classifying help us?

Mastery Criteria

The student will be able to divide a group of terms into three categories and select a heading that best describes each category of terms.

52

GEOGRAPHY, U.S. REGIONS

GRADE 5

Reasoning Competency

#9 The pupil can put items into serial order.

Type of Activity

Word list.

Source

Our Working World, Regions of the United States, S.R.A.

Materials

List of water sources, "Water Supply and Use in Billions of Gallons Daily" from Problem Book: *Our Working World, Regions of the United States, S.R.A.*

Directions

To create interest refer to the map on p. 22 of the Problem Book. Discuss the location of the rivers and other water sources as well as the direction in which they flow.

Give students the list with rivers and the daily water supply.

Have the students put the items into serial order.

Mastery Criteria

The student will be able to put the river systems into serial order.

Water Supply and Use in Billions of Gallons Daily

North Atlantic	163
South Atlantic — Gulf	197
Great Lakes	63
Ohio	125
Tennessee	42
Upper Mississippi	65
Lower Mississippi	48
Souris — Red — Rainey	6
Missouri	54
Arkansas — White — Red	96
Texas — Gulf	39
Upper Colorado	14
Rio Grande	5
Columbia — North Pacific	210
Great Basin	6
Lower Colorado	3
California	65
Alaska	710

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U.S. HISTORY, INDUSTRIALIZATION

GRADE 6

Reasoning Competency

#9 The pupil can put items into serial order.

Type of Activity

Worksheet and reading.

Source

The Social Sciences: Concepts and Values Harcourt & Brace, 1975 edition.

Materials

Textbook and worksheet, "Making Steel", p. 145.

Directions

Have the students read the section "Making Steel" on p. 145.

Distribute the worksheet, "Making Steel" to the class. Have the students put the statements of the steel making process in proper order.

Mastery Criteria

The student will be able to identify correctly the order in which steel is made.

54

GEOGRAPHY, U.S. REGIONS

GRADE 5

Reasoning Competency

#10 The pupil can distinguish between statements of fact and statements of opinion.

Type of Activity

Worksheet

Source

Your Country and Mine, Ginn and Co. Teacher designed worksheet.

Materials

Textbook for reference.
Worksheet, "Fact and Opinion: The President and the Atlantic Coast"

Directions

Remind students that in studying the Middle Atlantic States, there is a picturesque area known as the Great Valley. Review some facts about it.

Distribute the worksheet containing some factual statements and some opinion statements.

Have the students determine which statements are fact and which are opinion. You may have the student to change the opinions to facts.

FACT & OPINION
THE PIEDMONT & THE ATLANTIC COAST

Directions: Put a check for each statement that is fact and for each opinion statement in the space provided.

_____ 1. The Appalachian Mountains streach from New England to Alabama.

_____ 2. It is difficult to climb these mountains because they are covered with forests.

_____ 3. The Great Valley is a great vacation spot.

_____ 4. The Shenandoah Valley is a part of the Great Valley.

_____ 5. Where the Piedmont meets the Atlantic Coastal Plain many conflicts arose over territorial rights.

_____ 6. The Great Valley is a rich farm land producing 60% of the world's food supply.

_____ 7. Daniel Boone was one of the first pioneers to venture over the Appalachians.

_____ 8. Long highways reach through the Great Valley.

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AREA STUDIES, CANADA

GRADE 6

Reasoning Competency

#10 The pupil can distinguish between statements of fact and statements of opinion.

Type of Activity

Brainstorming and analyzing.

Source

Teacher constructed.

Materials

Chalkboard.

Directions

Before beginning a unit on Canada, do this exercise with the class.

Tell them to *brainstorm* things that they know or think about Canada. Set up rules for them:

1. Whatever they say will be put on the board.
2. No arguing or discussion of their ideas will be made.
3. The purpose is to generate as many ideas as possible in a short time.
4. Everyone should contribute.

Tell them to phrase their thoughts as *statements*, some examples are:

Canada is a very large country.
Canadians are proud of their country.
Canada borders on Vermont.
Some people in Quebec speak French.
Canada is pink on my map at home.
Vive le Quebec libre!

Write their statements on the board as they say them. Do not criticize, argue with, or discuss their statements.

Have students, on their papers, indicate which are statements of fact, which are statements of opinion.

Collect papers, then discuss with the class the nature of their statements, and use them to introduce the unit on Canada.

Mastery Criteria

The students will be able to identify correctly each statement as fact or opinion.

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CIVICS, GOVERNMENT

GRADE 9

Reasoning Competency

#10 The pupil can distinguish between statements of fact and statements of opinion.

Type of Activity

Reading, writing, discussion.

Source

American Citizenship, Scholastic Book Services, New York, 1980.

Materials

Reading, pp. 91-95.
Teacher or student made answer sheet.

Directions

Introduce the activity by providing the students with examples of statements of fact and statements of opinion.

Have the students read pp. 91-95 from *American Scholastic* and select five statements of fact and five statements of opinion. The reading is based on a short play of the 1787 Philadelphia Convention.

Individually or in small groups have the students explain the reasons for each selection.

Mastery Criteria

The student will be able to distinguish fact from opinion statements in a selected reading on the 1787 Philadelphia Convention.

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CIVICS, GOVERNMENT

GRADE 9

Reasoning Competency

#10 The student can distinguish between statements of fact and statements of opinion.

Type of Activity

Statement analysis.

Source

American Citizenship Program: Politics and People, Scholastic, Chapter 1, "What Is Politics?" p. 6.

Materials

Worksheet, "Distinguishing between statements of fact and statements of opinion: politics."

Directions

Explain the difference between statements of *fact* and *opinion* with some examples.

Have the students give examples of statements they feel to be *fact* or *opinion*.

Now explain the directions on the worksheet and have the students complete the exercise.

Mastery Criteria

The student will be able to identify a statement of opinion when presented with a series of statements of fact and opinion.

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LATIN AMERICA

GRADE 6

Reasoning Competency

#11 Given dilemma situation, the pupil can take at least two positions and give reasons for each.

Type of Activity

Dilemma.

Source

Teacher constructed.

Materials

Juan Peron, Leader of Argentina.

Directions

Have the students read the dilemma.

Tell students to state two reasons for and two reasons against shutting down the newspaper.

Mastery Criteria

Students will be able to state two different reasons for each side of the issue.

Juan Peron, Leader of Argentina

You are Juan Peron, leader of Argentina. You have come to power by promising the thousands of poor people justice and fairness, and an end to unfair landlords and rich, ruthless local leaders. The people of Argentina have enjoyed the new sense of freedom and justice you have instilled.

The publisher of the evening newspaper, a rich man, has been publishing stories and editorials that are critical of your rule. Many people read this paper, and they are getting upset and angry when they read the articles that criticize you. Last week, some people who had read the paper got in a big fight in Buenos Aires and four people were killed. Some of them favored your continued rule; others agreed with the newspaper and want you to step down.

Some of your advisors have suggested that you shut down the newspaper and put the publisher in jail. Others have warned that this would not be a good idea. What should you do?

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CIVICS, GOVERNMENT

GRADE 9

Reasoning Competency

#11 Given a dilemma situation, the pupil can take at least two positions and give reasons for each.

Type of Activity

Decision making.

Source

American Citizenship Program: Foundations of Our Government, Scholastic, Chapter 1, "Why do we need Government," p. 5.

Materials

Worksheet, "Supporting opinions: You make the rules."

Directions

Explain why we have rules and laws for the "general welfare" of our society.

Tell the students that they will be making some decisions about using park lands in Morris County, New Jersey.

Now explain the rules for the park and have the students decide whether they are necessary or unnecessary and give reasons for their decision. You may want to have the students work individually or in groups.

Finally, have the students share their decisions with the rest of the class. Focus the discussion on reasoned answers for each of the proposed rules.

Mastery Criteria

The students will be able to decide on the appropriateness of rules with reasons for approval or disapproval of each.

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CIVICS, LAW-RELATED EDUCATION

GRADE 9

Reasoning Competency

#11 Given a dilemma situation, the pupil can take at least two positions and give reasons for each.

Type of Activity

Decision making.

Source

Vermont Legal Education Guide, pp. 106-107.

Materials

Story I.

Directions

Discuss with the students the meaning of a dilemma situation.

Reproduce and hand out a copy of Story I on p. 106 of the *Vermont Legal Education Guide*.

Ask students to read it and decide how they would resolve the dilemma and support their decision with two reasons, then take the opposite point of view and support that position with two reasons.

Discuss the findings and compare the ideas which led to the decisions.

Mastery Criteria

The students will be able to take two different ideas of an issue and support each position with at least two reasons.

STORY 1

Patrick and six of his friends visit the local fishing area with Dave, their camp counselor. As a special treat, Dave has made arrangements with a local lobster fisherman to take the children out in his boat for a ride.

When Dave and Captain Conner leave for a few minutes to check weather conditions at the Coast Guard Station, they put Patrick in charge, but before they go, Captain Conner explains his rules about the boat. NOBODY is to set foot on his boat unless he is present. He warns the children that if this important rule is broken, the whole trip is off, and no one will get a ride.

Tempted by guages, levers, the steering wheel, and some fishing lines on the boat, three children climb aboard. However, the others eventually persuade them to get off before Dave and Captain Conner return.

The children ask Patrick what he intends to do about the kids who got on the boat. will he tell or not? Patrick's decision is a complicated one because his desire to tell the truth conflicts with several other values strongly held by children Patrick's age. Concern about having and keeping friends, doing things that are fun such as going on a fishing trip, and being fair in regard to the children who stayed off the boat as they had been told are issues that must be considered.

The pupils, as well as Patrick, must make up their minds — what is the right thing for Patrick to do? Careful consideration of all conflicting *reasons* is encouraged before final judgments are made.

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CIVICS, LEGAL EDUCATION

GRADE 9

Reasoning Competency

#11 Given a dilemma situation, the pupil can take at least two positions and give reasons for each.

Type of Activity

Decision making.

Source

Vermont Legal Education Guide, pp. 97-98.

Materials

"The Fallout Shelter Game", pp. 97-98.

Directions

Reproduce "The Fallout Shelter Game" and give each student a copy.

Explain that each student must select five individuals to go into the shelter to survive.

Have each student give two reasons for each selection.

As an optional activity have students rank order their choices and give reasons for each.

Mastery Criteria

The student will be able to give reasons for each of the positions.

62

U.S. HISTORY, URBAN STUDIES

GRADE 5

Reasoning Competency

#12 From a chart, graph, table, map, or a list of facts, the pupil can state a summary or conclusion based on the data.

Type of Activity

Table interpretation

Source

Our Working World, SRA
"Problems Book" for *The American Way of Life*, p. 59.

Materials

Table showing percent of urban population in each state in 1920 and 1960.
Outline map of the United States.

Directions

Have students look at the table. Make sure they understand what it means (urban vs. rural; percent; etc.)

Ask them if they can draw any conclusions from the table. Tell them to write those down.

Give a United States outline map to each student. Tell half the class to make their map indicate urbanization in 1920, the other half to do for 1960. They can do this by shading in the states that have more than 50% urban population.

Display the maps so that all students can see both sets of maps.

Again, ask them to come up with some conclusions and to write them down.

Have students share their conclusions in small groups, or in a whole-class discussion.

(OPTION 1) If you get a lot of different conclusions, list them on a ditto. Hand it out and ask students to determine which of them can be validly drawn from the data. This would practice Competency ***#13***.

(OPTION 2) To carry this lesson further and deal with Competency ***#5***, to *predict the consequences* of this government policy:

In 1985, to curb creeping urbanization and to end the problems of inner cities, the

FALL OUT SHELTER GAME

You are a committee to decide who goes into the shelter.

You cannot go yourself.

You must choose six out of ten candidates. They are:

- A pregnant high school drop-out of dubious I.Q.
- A 28-year-old ex-policeman who was thrown off the force for police brutality.
- A female M.D., 37 years old, who has had a hysterectomy.
- A 75-year-old rabbi (Reformed).
- An architect, 31 years old, who is an ex-con. He was convicted of pushing narcotics.
- A 25-year-old law student. He is an Ivy League graduate but he's married and won't go without his wife. If you choose him, you've chosen two people.
- The law student's wife who is 26 but has a terminal disease which is believed to be hereditary. She won't go without her husband.
- A retired prostitute who is living on her annuities. She is 37 years old.
- A 20-year-old black militant who is very angry. He has no particular skills that we know of.
- A 45-year-old male violinist who is extremely artistic and creative but is suspected of homosexuality.

(Adapted from materials of the Lincoln-Filene Center Law Program)

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U.S. HISTORY, ETHNICITY

GRADE 5

Reasoning Competency

#12 From a chart, graph, table, map, or list of facts, the pupil can state a summary or conclusion based on the data.

Type of Activity

Collage.

Source

Minneapolis Multi-Ethnic Curriculum Project, Act. 12, "Ethnic Collages."

Materials

Old magazines
Large pieces of cardboard
Glue
Scissors

Directions

Students will need some background on ethnicity. They should have previously studied factors determining ethnicity such as religion, dress, housing, dance, etc.

Introduce this activity by telling the students that they will be given a chance to demonstrate in an artistic way their understanding of the main ideas of ethnicity. Divide the class into small groups of about four students.

Now, tell the groups that their task will be to construct collages illustrating different characteristics of ethnic groups. Each group should construct one collage. The collage may focus on one ethnic group or on one characteristic that varies from one ethnic group to another such as religion, art, celebrations.

Next, hand out materials to the students and let them work on their collages. After the collages have been completed, have each group prepare a short (one page) description or explanation of its collage. Then post the collages and explanations around the classroom.

Mastery Criteria

The student will be able to draw a valid conclusion on the characteristics of at least two ethnic groups.

Congress voted to increase the income tax of urban residents by 40%, and reduce the tax for rural residents by 40%.

Tell students to list as many *consequences* of this law as they can.

(OPTION 3) Tell students to put themselves in the place of the President of the U.S. who must decide whether or not to sign this congressional action into law. Have students write at least two reasons for signing the bill, and two reasons for vetoing it. (Competency *#11*)

Mastery Criteria

For mastery, the student must be able to draw a conclusion that relates both geography, time period, and urbanization *at the same time*. Accept all valid conclusions, but count only the all-inclusive ones as mastery.

OPTIONAL:

If you go on to the second Option, require at least 3 different logical consequences for mastery.

OPTIONAL:

If you go on to the third Option, require at least 2 different reasons for vetoing, and two different reasons for signing the bill. The reasons must relate to taxes, urbanization, government structure, population, politics, geography, or other topics involved in the problem.

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AREA STUDIES, GEOGRAPHY

GRADE 5

Reasoning Competency

#12 From a chart, table, map or list of facts, the pupil can state a summary or conclusion based on the data.

Type of Activity

Map analysis.

Source

In Latin America and Canada, D.C. Heath, 1969.

Materials

Text, pp. 352-53; 378-79.

Directions

Show students the maps on pp. 378-379 and 352-353. These maps show population, land use, land forms, and precipitation.

Ask the students these questions:

What conclusion can you draw from these maps?

What effect does land use have on population? Effect on annual income?

What is the relationship between land use and occupations?

How is the income effected by land use?

How do the political divisions relate to land forms?

How do land forms relate to land use?

As a concluding activity have each student write a brief summary of the information gathered from the maps.

Mastery Criteria

The student will be able to take basic information from each map and show the effects that land forms, land use, political divisions, cultural zones, and population distribution have on one another.

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U.S. HISTORY, MEXICO

GRADE 6

Reasoning Competency

#12 From a chart, graph, table, map or list of facts, the pupil can state a summary or conclusion based on the data.

#13 From a list of data and several possible conclusions, the pupil can identify those conclusions which could be validly drawn from the data.

Type of Activity

Graph reading and interpretation.

Source

Exploring World Regions, Follett Publishing Co., 1975, p. 116.

Materials

Graphs of Mexico's population growth, 1800-1970, p. 116 of text.

Directions

Show the students the graph. (Duplicate or project it if students do not have copies.)

Tell students to list at least three possible conclusions that could be drawn from the data on these graphs.

Then tell them to list at least three possible *invalid* conclusions that might be drawn.

Collect their papers. Use their list to determine their skill at Competency ***#12*** (this is *not* mastery level, though).

Take their lists of *invalid* conclusions and combine them (or a selected few) with an equal number of *valid* conclusions onto a ditto. Distribute this ditto to the class.

Tell the class to determine which conclusions on this list could be validly drawn from the data. Have them explain *why* or *why not* for each one. Their papers can be used to assess their skill at Competency ***#13***, not, at mastery level, however.

66

U.S. HISTORY, LABOR

GRADE 8

Reasoning Competency

#12 from a chart, graph, table, map, or a list of facts, the pupil can state a summary or conclusion based on the data.

Type of Activity

Chart interpretation.

Source

The Pageant of American History, Allyn and Bacon, Inc., 1975.

Materials

Chart on agricultural and industrial workers between 1820 and 1930, p. 398.

Directions

Explain briefly the limits and purpose of the chart.

Ask students to study the data carefully and write out two valid conclusions based on the information given.

Mastery Criteria

For mastery level, the student must draw two conclusions from two sets of data.

CIVICS, POLITICS

GRADE 9

Reasoning Competency

#12 From a chart, graph, table, map, or a list of facts, the pupil can state a summary conclusion based on the data.

#13 Form a list of data and several possible conclusions, the pupil can identify those conclusions which could be validly drawn from the data.

Type of Activity

Reading analysis.

Source

American Citizenship, Scholastic Book Services, 1980.

Materials

Four biographies in text, pp. 223-224.

Directions

Be sure that students understand the meadning of the terms *conclusions* and *data*.

Assign the reading of the four biographies, pp. 223-224.

When the students have finished reading have them write down the conclusions which led them to select the person they consider most qualified to be President of the United States.

Ask students to write down specific items of information which led them to their conclusions.

Lead the class in a discussion of student responses.

Mastery Criteria

The student will be able to identify three conclusions that led to their choice and explain the specific data that led to those conclusions.

U.S. HISTORY, EDUCATION

GRADE 5

Reasoning Competency

#13 From a list of data and several possible conclusions, the pupil can identify those conclusions which could be validly drawn from the data.

Type of Activity

Reading and interpreting.

Source

Teacher constr cted.

Materials

Reading, "One Room School." (following page)

Directions

Give students a copy of the reading.

From the above data, the students will determine which of the following conclusions could be true:

Girls in the early days did not like schools

Printing methods were expensive so textbooks were scarce.

Men were believed to be more intelligent than women.

Teaching by age groups was easier for the teacher.

Ask the students to explain why their choices are valid.

Mastery Criteria

Students will select the valid conclusions and will be able to explain their choices.

One Room School

In 1830, many schools in small towns had only one room. Most of the students were boys. Children between the ages of six and fourteen all sat together in the same classroom. For this reason, the teacher often divided the class into different age groups and taught one group at a time.

There were very few textbooks, so students had to share them. The teacher was usually a man. When he was not teaching, he often helped the farmers harvest crops.

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GEOGRAPHY, ENERGY

GRADE 7

Reasoning Competency

#13 From a list of data and several possible conclusions, the pupil can identify those conclusions which could be validly drawn from the data.

Type of Activity

Worksheet.

Source

Graphs, Scholastic Social Studies Skills, Scholastic, Lesson 12.

Materials

Student worksheets.
Overhead projector.

Directions

Help the students read the bar graph, "U.S. Consumption of Major Fuel Sources." Project the Lesson Transparency and have students note the changes in U.S. fuel consumption from 1940-1970.

Once they are familiar with the key, distribute copies of both spirit masters and have them complete the worksheet.

Mastery Criteria

The students will be able to identify valid conclusions from the graph. Satisfactory completion of the questions in part C (7-14) will demonstrate mastery.

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CIVICS, OCCUPATIONS

GRADE 5

Reasoning Competency

#14 The pupil can gather data on a given topic from at least three different sources.

#15 The pupil can select and organize data on a given topic into a meaningful report.

Type of Activity

Research and reporting.

Source

Teacher constructed.

Materials

Reference books.
Social Studies books.

Directions

Begin the lesson with a review of different occupations students have read about in their Social Studies text. You may also want to include the occupations of their parents.

Make a list of these occupations on the chalkboard, and categorize the occupations by job family.

Divide the class into groups and assign each to a job family for research purposes.

Review the criteria for writing a report.

After the students have completed their reports, have them share them with the rest of the class.

Mastery Criteria

The students will be able to gather material on occupations from several sources and organize it into a written report.

Additional Materials

Charts, graphs, pictures or any pertinent information the student might be able to bring from home can also be used.

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SOCIAL STUDIES, RESEARCH PROJECTS

GRADE 7

Reasoning Competency

#14 The pupil can gather data on a given topic from at least three different sources.

Type of Activity

Research.

Source

Teacher designed (Douglas Kroc — Brattleboro Union High School)

Materials

Worksheet for students
Learning Center for research.

Directions

Explain to the students that they will be doing a research project.

Pass out a sample format with some examples of important events, their dates and sources of information about those events. In addition, provide an example of what would constitute a paragraph summary.

Mastery Criteria

The student will be able to list three specific sources and write a summary paragraph.

CIVICS, RESEARCH PROJECTS

GRADE 9

Reasoning Competency

#15 The pupil can select and organize data on a given topic into a meaningful report.

Type of Activity

Student research project.

Source

Texts, library, periodicals, speeches, editorials, films, T.V. documentaries, personal interviews, etc.

Materials

Teacher selected.

Directions

Assign a topic to the student for research. (For example, 1968 presidential election)

Explain to the student that the report must contain at least three sources of different types (Print, Nonprint, Human resource).

Explain that only relevant data from each source will be accepted.

Mastery Criteria

the student will be able to organize information gathered logically.

 "END OF DOCUMENT"